# Arboviruses in the News: Chikungunya, Dengue and Zika Viruses (15 Jan 2016)

There has been recent spread of even more arboviral (**Ar**thropod **Bo**rne **Viral**) diseases to new areas over the last year. The Arbovirus many of you have had experience with is dengue, transmitted via *Aedes* spp. mosquitoes but recently other arboviral diseases have jumped geographic boundaries to infect new areas. Although dengue is probably the most dangerous of these three viruses chikungunya and Zika are new to the Americas and many people are unaware of these illnesses. *Aedes egypti* and *Aedes albopictus* are the two main species of mosquitoes that carry these diseases.

*Aedes aegypti*

*Aedes albopictus*

Chikungunya – an alphavirus that in the same family with Eastern and Western Equine Encephalitis viruses. Not related to dengue or Zika virus.
Dengue – a flavivirus, is in the same family with numerous pathogens including Yellow Fever, Japanese encephalitis, St Louis encephalitis, tick borne encephalitis, West Nile and Zika viruses
Zika - another flavivirus that is closely related to dengue and often misdiagnosed as dengue or chikungunya

The illnesses caused by these three diseases have very similar/overlapping clinical presentation with prominent fever, headache, rash, myalgias (muscle aches) and arthralgias (joint aches). In fact, serologic (antibodies in blood) surveys have demonstrated that outbreaks attributed to dengue in the past have actually turned out to be chikungunya or Zika infections. Dengue and chikungunya are genetically distant relatives but Zika virus is closely related to dengue and often cross reacts (i.e. gives a false positive dengue test) on dengue serology or on some rapid assays that are available at some posts.

Although dengue is the most serious of these infections, with a dengue shock syndrome occurring in a small minority of patients it is often asymptomatic (~75% of infections) whereas chikungunya is rarely fatal but causes symptomatic infection in 75-95% of infections. Zika is not associated with deaths and, like dengue, is asymptomatic in 75% of infections.

**Chikungunya** virus was originally an African illness and means 'that which bends up" in the Makonde language of East Africa. For many years chikungunya was confined mainly to Africa but in the last decade has exploded through Asia and is now moving thru from the Caribbean to Central and South America. The incubation period of chikungunya disease ranges from 2-12 days, typically 3-7days. Symptoms include sudden onset of a fever, typically lasting from a few days to a week, sometimes up to ten days, usually above 39°C and sometimes reaching 40°C (104°F). The fever is associated with severe joint pain or stiffness. A maculopapular (red bumps) rash, muscle pain, headache, fatigue, nausea or vomiting may also be present. Inflammation of the eyes occurs in some.

Typically, fever lasts for two days and then ends abruptly but may be biphasic (resolves and then returns later). Headache, insomnia and an extreme degree of prostration (feeling wiped out and requiring bedrest) last for a variable period, usually about 5-7 days.
The severity of joint complaints in chikungunya may be severe and may persist for weeks, months or years in some individuals. The French have found that 80-90% of patients have some joint complaints at 3 months and 5% develop chronic joint complaints that persist for years.
Deaths from chikungunya mainly occur in elderly individuals with comorbid illness. The one group to be concerned about are pregnant women who may transmit chikungunya to their infant if they become infected just before giving birth, this has caused a small number of deaths in infected neonates.
Media reports will of course, sensationalize the threat to the population and focus on the handful of the most severe cases (Lindsay Lohan, among her other troubles, developed chikungunya).

**Dengue virus** serovars are widespread in the tropics and have caused massive outbreaks, it is considered the most rapidly spreading arboviral disease in the world with a 30 fold increase in cases in the last 50 years. It is clearly related to the prevalence of *Aedes aegypti* in most areas but is carried by other *Aedes* spp in other areas. I will not go into dengue more as the WHO has a very thorough dengue monograph. Recently a dengue vaccine has been approved in some countries, it is designed for those living in areas with dengue for many years who have had opportunities for multiple infections, it is NOT recommended for travelers (or most expats) at this time and has not been submitted to the US FDA for approval.

**Zika virus** is another African arboviral illness first seen in monkeys in Uganda in 1947 but has moved onto the front pages recently as it is becoming established in the Americas.

The main clinical symptoms of Zika are low-grade fever (< 38.5 °C or 101.3°F), transient arthritis/arthralgia (joint aches and pain) with possible joint swelling (mainly in the smaller joints of the hands and feet) and maculopapular (red bumps) rash that often starts on the face and then spreads throughout the body, conjunctival suffusion (red eyes) or bilateral non-purulent conjunctivitis (eye inflammation without pus)with general non-specific symptoms such as myalgia (muscle aches), asthenia (weak and tired) and headaches.

Clinical symptoms of Zika disease appear after an incubation period ranging between 3 and 12 days. The disease symptoms are usually mild and short lasting (2–7 days), and infection may go unrecognized or be misdiagnosed as dengue. Association with a post infection neurological complication called Guillain-Barré syndrome has been recently described in a small number of patients.

Zika has been documented in the Pacific Islands, especially French Polynesia but there is serologic evidence of infections in India, SE Asia and the Philippines. In 2015 Zika infections were confirmed in Brazil and have begun moving up through the Americas. Cases have been confirmed in most of Central

and South America ans some of the Caribbean, including Puerto Rico. We can expect this infection to spread to other countries, possibly including the US, in the future.

The great concern about Zika has been the possible association with severe neurologic problems in fetuses when pregnant women become infected. There has been a marked increase in cases of microcephaly in Brazil seen at the same time as a spike in Zika infections has occurred. The Zika link to microcephaly is being intensely investigated but appears to be most concerning for Zika infections during the first trimester.

On 15 January 2016 the CDC felt that there was sufficient evidence linking microcephaly to Zika infections that it issued a Class 2 Travel Alert for affected countries in the Americas for pregnant women advising them against taking unnecessary trips to these areas. MED has offered to medevac pregnant women who are under COM authority back to the US at any time during their pregnancy.

This is a very actively evolving situation and you are invited to follow developments on the MED Website- Med Alert: Zika as well as these other reliable sources of information:

Centers for Disease Control and Prevention Zika Virus
Pan American Health Organization Zika virus
European Center for Disease Prevention and Control Zika Virus

**Prevention Efforts**

There are no treatments for any of these arboviral illnesses beyond supportive care and no vaccines are currently approved so **mosquito prevention is crucial**.

**The chances of being infected with these three illnesses can all be diminished by mosquito control. *Aedes* mosquitoes live and breed in fresh water near and in homes. Anything that can hold a cup or more of water including birdbaths, tire swings, planters, old bottles, trash cans, even the back of a toilet tank have all been breeding areas. (See the posters below).**

**There is no danger in touching mosquito larva and instructing your family in looking in your home and yard for containers with larva (or potential breeding containers) and dumping them out is a great way to involve everyone in mosquito vigilance.**

**Controlling mosquitoes in your yard is most important, *Aedes* generally don't fly all that far and most biting occurs from mosquitoes born and raised right in your neighborhood.**

**Use CDC recommended insect repellents containing either 20% DEET, picaridin or IR3535. Use of permethrin spray on and clothing can all diminish the chances of being bitten. Treating lawn furniture, curtains, blinds, clothing and tents with permethrin and sleeping in screened or air conditioned rooms will help diminish bites from mosquitoes.**

**Since *Aedes* are day biting mosquitoes bed nets have not been very helpful for prevention of their bites but children or others who sleep during the day may benefit from use of an impregnated bed net.**

***Aedes* mosquitoes tend to rest inside your home and are most frequently found under beds, in closets and in bathrooms. Periodically spraying these areas with permethrin or other insecticide will kill these mosquitoes while they rest.**

The *Aedes* vectors are widespread throughout the world, including much of the eastern US (the most common mosquito in my backyard in DC is *Aedes albopictus*), and we can expect that chikungunya and Zika viruses will become established in additional countries as well as possibly into the US. **Be prepared by controlling mosquitoes even before these diseases come to your area.** Be assured that even if you are infected the majority of people have either an infection with no symptoms or have a self-limited illness and make a full recovery.

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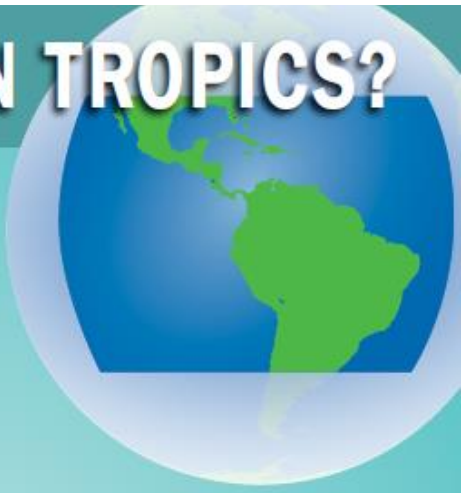
# GOING TO THE AMERICAN TROPICS?



**MOSQUITOES** spread **DENGUE, CHIKUNGUNYA, ZIKA, and other diseases**

Mosquitoes bite day and night.
Prevent mosquito bites:

- Use insect repellent
- Use air conditioning or window/door screens
- Wear long-sleeved shirts and long pants

## DON'T LET MOSQUITOES RUIN YOUR TRIP

For more information, visit www.cdc.gov/travel

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

# Help Control Mosquitoes that Spread Dengue, Chikungunya, and Zika Viruses

**B Z Z Z z.**

Aside from being itchy and annoying, the bite of an infected female mosquito (*Aedes aegypti or Aedes albopictus*) can spread dengue, chikungunya, or Zika viruses. People become infected with dengue, chikungunya, or Zika after being bitten by an infected mosquito.

- Female mosquitoes lay several hundred eggs on the walls of water-filled containers. Eggs stick to containers like glue and remain attached until they are scrubbed off. When water covers the eggs, they hatch and become adults in about a week.
- Adult mosquitoes live inside and outside.
- They prefer to bite during the day.
- A few infected mosquitoes can produce large outbreaks in a community and put your family at risk of becoming sick.

## Protect Yourself, Your Family, and Community from Mosquitoes

### 1. Eliminate standing water in and around your home:

- **Once a week**, empty and scrub, turn over, cover, or throw out items that hold water, such as tires, buckets, planters, toys, pools, birdbaths, flowerpots, or trash containers. Check inside and outside your home.
- Tightly cover water storage containers (buckets, cisterns, rain barrels) so that mosquitoes cannot get inside to lay eggs.
- For containers without lids, use wire mesh with holes smaller than an adult mosquito.

### 2. If you have a septic tank, follow these steps:

- Repair cracks or gaps.
- Cover open vent or plumbing pipes. Use wire mesh with holes smaller than an adult mosquito.

### 3. Keep mosquitoes out of your home:

- Use screens on windows and doors.
- Repair holes in screens.
- Use air conditioning when available.

Put plants in soil, not in water.

Drain water from pools when not in use.

Recycle used tires or keep them protected from rain.

Drain & dump any standing water.

Weekly, scrub vases & containers to remove mosquito eggs.

National Center for Emerging and Zoonotic Infectious Diseases
Division of Vector-Borne Diseases

CS258303

## 4. Prevent mosquito bites:

- Use an Environmental Protection Agency (EPA)-registered insect repellent with one of the following active ingredients. All EPA-registered insect repellents are evaluated to make sure they are safe and effective.

| **Active ingredient** Higher percentages of active ingredient provide longer protection | **Some brand name examples*** |
|---|---|
| **DEET** | Off!, Cutter, Sawyer, Ultrathon |
| **Picaridin**, also known as **KBR 3023, Bayrepel**, and **icaridin** | Cutter Advanced, Skin So Soft Bug Guard Plus, Autan (outside the United States) |
| **IR3535** | Skin So Soft Bug Guard Plus Expedition, SkinSmart |
| **Oil of lemon eucalyptus** (OLE) or **para-menthane-diol** (PMD) | Repel |

* Insect repellent brand names are provided for your information only. The Centers for Disease Control and Prevention and the U.S. Department of Health and Human Services cannot recommend or endorse any name brand products.

  - Always follow the product label instructions.
  - Reapply insect repellent every few hours, depending on which product and strength you choose.
  - Do not spray repellent on the skin under clothing.
  - If you are also using sunscreen, apply sunscreen first and insect repellent second.
- Treat clothing and gear (such as boots, pants, socks, and tents) with permethrin or purchase permethrin-treated clothing and gear.
  - Treated clothing remains protective after multiple washings. See product information to find out how long the protection will last.
  - If treating items yourself, follow the product instructions carefully.
  - Do **not** use permethrin products, intended to treat clothing, directly on skin.
- Wear long-sleeved shirts and long pants.


Keep rain barrels covered tightly.


Weekly, empty standing water from fountains and bird baths.


Keep septic tanks sealed.


Install or repair window & door screens.

For more information, visit:
www.cdc.gov/dengue, www.cdc.gov/chikungunya, www.cdc.gov/zika

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